Privacy Protection Amid Giant Components

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Previous Work

<u>Goal</u>: Infer the infection status of individual nodes given graph topology.

<u>Setup</u>

- **Model:** Independent Cascade
- **Random Graphs:** $G_{n,p}$, Chung-Lu
- **Average Degree:** z
- **Number of infected nodes:** X_n
- **Sublinear privacy mechanism:** $\mathcal{M}(X_n)$

<u>Takeaways</u>

Nodes in the largest component have the same infection status

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$\mathcal{M}(X_n)$ indicates the infection status of the largest component

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$P(\text{Node } i \text{ infected}) \geq P(\text{Node } i \text{ in largest infected component})$

Extensions

Goal: Infer the infection status of individual nodes given graph topology.

Setup

- **Model: Linear Threshold**
  $$\phi \sim Unif\left[0, \frac{1}{m}\right], m \geq 1$$
- **Random Graphs:** $G_{n,p}$, Chung-Lu
- **Average Degree:** z
- **Number of infected nodes:** X_n
- **Sublinear privacy mechanism:** $\mathcal{M}(X_n)$

Preliminary Results

Privacy is hard to preserve when a large cascade occurs

For $G_{n,p}$: Large cascade occurs with positive probability if $m > \frac{z}{z-1+(1-p)^n}$

References

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